What is claimed is:

1. A CVD apparatus comprising:

a vacuum vessel having an inside in which plasma is produced to generate active species, and film deposition is performed on a substrate by using the active species and a reactive gas;

an electrically-conductive partitioning wall section formed in the vacuum vessel for separating the inside thereof into two chambers;

a first one of the two chambers is formed as a plasma-generating space and contains a radio-frequency electrode;

a second one of the two chambers is formed as a film deposition process space and contains a substrate support mechanism for mounting a substrate;

the partitioning wall section includes a plurality of through-holes to allow communication between the plasma-generating space and the film deposition process space, the through-holes satisfy the condition of $uL/D > 1$, where u represents a gas flow velocity in the through-holes, L represents an effective length of the through-holes, and D represents an inter-diffusion coefficient;

the partitioning wall section includes an interior space separated from the plasma-generating space and communicating with the film deposition process space through a plurality of diffusion holes;

means for delivering a first gas to the plasma-generating space so that it passes through the through-holes at velocity u;

means for delivering into the interior space a reactive gas supplied from outside the vacuum vessel, whereby the reactive gas thus supplied into the interior space is fed to the film deposition process space through the plurality of diffusion holes; and

means for supplying an RF power to the radio-frequency electrode for generating a plasma discharge in the plasma-generating space, by which the active species produced in the plasma-generating space are fed into the film deposition process space via the plurality of through-holes formed in the partitioning wall section.

2. The CVD apparatus as stated in claim 1, wherein the diffusion holes satisfy the requirements of $uL/D > 1$, where u represents the gas flow velocity in the holes, L represents the effective hole length, and D represents the inter-diffusion coefficient.

3. The CVD apparatus as stated in claim 1, wherein the interior space of the partitioning wall section comprises a diffusing structure of at least two layers for diffusing the reactive gas uniformly in the interior space.

4. The CVD apparatus as stated in claim 2, wherein the interior space of the partitioning wall section comprises a diffusing structure of at least two layers for diffusing the reactive gas uniformly in the interior space.

5. A CVD apparatus as stated in claim 1, further comprising an RF power supply for feeding a cleaning RF power and means for connecting the partitioning wall section to the RF power supply with suitable timing so as to produce a cleaning plasma in the film deposition process space.

6. A CVD apparatus as stated in claim 2, further comprising an RF power supply for feeding a cleaning RF power and means for connecting the partitioning wall section to the RF power supply with suitable timing so as to produce a cleaning plasma in the film deposition process space.

7. A CVD apparatus as stated in claim 3, further comprising an RF power supply for feeding a cleaning RF power and means for connecting the partitioning wall section to the RF power supply with suitable timing so as to produce a cleaning plasma in the film deposition process space.

8. A CVD apparatus as stated in claim 4, further comprising an RF power supply for feeding a cleaning RF power and means for connecting the partitioning wall section to the RF power supply with suitable timing so as to produce a cleaning plasma in the film deposition process space.

9. A CVD apparatus as stated in claim 1, wherein the radio-frequency electrode is arranged in a center of the first one of the two chambers, and a plasma discharge is generated between (a) the radio-frequency electrode and (b) a part of the vacuum vessel and the partitioning wall section as an electrode surrounding a peripheral region of the radio-frequency electrode.

10. A CVD apparatus as stated in claim 2, wherein the radio-frequency electrode is arranged in a center of the first one of the two chambers, and a plasma discharge is generated between (a) the radio-frequency electrode and (b) a part of the vacuum vessel and the partitioning wall section as an electrode surrounding a peripheral region of the radio-frequency electrode.

11. A CVD apparatus as stated in claim 3, wherein the radio-frequency electrode is arranged in a center of the first one of the two chambers, and a plasma discharge is generated between (a) the radio-frequency electrode and (b) a part of the vacuum vessel and the partitioning

wall section as an electrode surrounding a peripheral region of the radio-frequency electrode.

12. A CVD apparatus as stated in claim 4, wherein the radio-frequency electrode is arranged in a center of the first one of the two chambers, and a plasma discharge is generated between (a) the radio-frequency electrode and (b) a part of the vacuum vessel and the partitioning wall section as an electrode surrounding a peripheral region of the radio-frequency electrode.

13. A CVD apparatus as stated in claim 5, wherein the radio-frequency electrode is arranged in a center of the first one of the two chambers, and a plasma discharge is generated between (a) the radio-frequency electrode and (b) a part of the vacuum vessel and the partitioning wall section as an electrode surrounding a peripheral region of the radio-frequency electrode.

14. A CVD apparatus as stated in claim 6, wherein the radio-frequency electrode is arranged in a center of the first one of the two chambers, and a plasma discharge is generated between (a) the radio-frequency electrode and (b) a part of the vacuum vessel and the partitioning wall section as an electrode surrounding a peripheral region of the radio-frequency electrode.

15. A CVD apparatus as stated in claim 1, wherein the radio-frequency electrode is arranged on an upper portion of the plasma-generating space for generating a plasma discharge between the radio-frequency electrode and the partitioning wall section.

16. A CVD apparatus as stated in claim 2, wherein the radio-frequency electrode is arranged on an upper portion of the plasma-generating space for generating a plasma discharge between the radio-frequency electrode and the partitioning wall section.

17. A CVD apparatus comprising:

a vacuum vessel having an inside in which plasma is produced to generate active species, and film deposition is performed on a substrate by using the active species and a reactive gas;

an electrically-conductive partitioning wall section formed in the vacuum vessel for separating the inside thereof into two chambers;

a first one of the two chambers is formed as a plasma-generating space and contains a radio-frequency electrode;

a second one of the two chambers is formed as a film deposition process space and contains a substrate support mechanism for mounting a substrate;

the partitioning wall section includes a plurality of through-holes to allow communication between the

plasma-generating space and the film deposition process space, the through-holes satisfy the condition of uL/D > 1, where u represents a gas flow velocity in the through-holes, L represents an effective length of the through-holes, and D represents an inter-diffusion coefficient;

the partitioning wall section includes an interior space separated from the plasma-generating space and communicating with the film deposition process space through a plurality of diffusion holes;

a device for delivering a first gas to the plasma-generating space so that it passes through the through-holes at velocity u;

a device for delivering into the interior space a reactive gas supplied from outside the vacuum vessel, whereby the reactive gas thus supplied into the interior space is fed to the film deposition process space through the plurality of diffusion holes; and

a device for supplying an RF power to the radio-frequency electrode for generating a plasma discharge in the plasma-generating space, by which the active species produced in the plasma-generating space are fed into the film deposition process space via the plurality of through-holes formed in the partitioning wall section.

18. The CVD apparatus as stated in claim 17, wherein the diffusion holes satisfy the requirements of uL/D > 1, where u represents the gas flow velocity in the

holes, L represents the effective hole length, and D represents the inter-diffusion coefficient.

19. The CVD apparatus as stated in claim 17, wherein the interior space of the partitioning wall section comprises a diffusing structure of at least two layers for diffusing the reactive gas uniformly in the interior space.

20. A CVD apparatus as stated in claim 17, further comprising an RF power supply for feeding a cleaning RF power and means for connecting the partitioning wall section to the RF power supply with suitable timing so as to produce a cleaning plasma in the film deposition process space.

21. A CVD apparatus as stated in claim 17, wherein the radio-frequency electrode is arranged in a center of the first one of the two chambers, and a plasma discharge is generated between (a) the radio-frequency electrode and (b) a part of the vacuum vessel and the partitioning wall section as an electrode surrounding a peripheral region of the radio-frequency electrode.

23. The CVD apparatus as claimed in claim 17, wherein the first gas is oxygen.

24. The CVD apparatus as claimed in claim 17, wherein the device for delivering the first gas includes a mass flow controller.